The AI gambit: leveraging artificial intelligence to combat climate change—opportunities, challenges, and recommendations

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Abstract

In this article, we analyse the role that artificial intelligence (AI) could play, and is playing, to combat global climate change. We identify two crucial opportunities that AI offers in this domain: it can help improve and expand current understanding of climate change, and it can contribute to combatting the climate crisis effectively. However, the development of AI also raises two sets of problems when considering climate change: the possible exacerbation of social and ethical challenges already associated with AI, and the contribution to climate change of the greenhouse gases emitted by training data and computation-intensive AI systems. We assess the carbon footprint of AI research, and the factors that influence AI's greenhouse gas (GHG) emissions in this domain. We find that the carbon footprint of AI research may be significant and highlight the need for more evidence concerning the trade-off between the GHG emissions generated by AI research and the energy and resource efficiency gains that AI can offer. In light of our analysis, we argue that leveraging the opportunities offered by AI for global climate change whilst limiting its risks is a gambit which requires responsive, evidence-based, and effective governance to become a winning strategy. We conclude by identifying the European Union as being especially well-placed to play a leading role in this policy response and provide 13 recommendations that are designed to identify and harness the opportunities of AI for combatting climate change, while reducing its impact on the environment.